

each end are seventy feet, so that the whole length of the bridge and wings are 1380 feet. On the Strand side, the arched approaches are 360 feet, and on the Surry side 760 feet; so that the total length of arched road way is 2500 feet.

The Trenton Bridge is also most circumstantially described by Mr. Pope. The two abutments and four piers are of stone, which support '*the wooden superstructure*;' the four arches next to the Pennsylvania side are each 194 feet span, and that on the New Jersey side 156 feet span; so that the whole length of waterway from one abutment to the other is 932 feet; and, including the piers, 1008 feet: and this the 'Scotsman' calls 'a quarter of a mile in length'—so does Mr. Pope, but then he adds the wing-walls to make up that length. And this bridge too, (which was finished in less than two years,) 'will bear a comparison with the most celebrated structures of the same kind in Britain'!

ART. V.—1. *The History of Small-pox.* By James Moore, Member of the Royal College of Surgeons, &c. Longman. pp. 312.

2. *The History and Practice of Vaccination.* By James Moore. Callow. 1818. pp. 300.

FROM the commencement of our labours, with one or two exceptions, we have purposely abstained from medical disquisitions, under the impression that they occupy a more appropriate place in publications devoted especially to their admission. The question, however, which we now propose to canvass is one in which all men are not only interested, but upon which, with the evidence before them, all are competent to decide—a question too which annually involves the lives of nearly forty thousand individuals in the British islands alone, and the constitution and personal appearance of vast numbers besides. It is,—whether the recently proposed substitute for small-pox can establish its claims of being an effectual and safe preventive of that distemper? Until this question be finally decided, its agitation can never be out of time; but we have, perhaps, chosen the fittest of all periods for our remarks upon it, since the doubts of many as to the efficacy of vaccination, which had died away under the weight of evidence in its favour, have, by recent circumstances, been revived. At the moment in which we are writing, there are numberless parents suffering under the most cruel apprehensions lest their children should in after-life be obnoxious to one of the most formidable and fatal of all diseases. The vaccinated child, it is said, may resist the small-pox influence for a longer or shorter period, according to its peculiarity of constitutional temperament; but there is nevertheless a limit to this exemption, and the same

small-pox which cannot now be communicated even by inoculation, may, in after-life, spontaneously occur as the result of a prevailing infection. To enlarge, however, upon the importance of our present undertaking would be a waste of words; we shall therefore proceed to the business before us.

At the head of the present article we have placed the titles of two works, recently published by Mr. Moore,—the one on small-pox, and the other on vaccination—as it is conceived that a succinct history of the former will impart a somewhat more lively interest to the investigation of the merits of the latter.

It is in vain that we search the writings of the ancients for the description of any disease that can be recognised as small-pox, and the inference is therefore more than presumptive that the Greek and Roman fathers of medicine never saw the malady in question. The contrary position has, indeed, been maintained by those who can discern nothing in modern science of any kind which was not familiar in a different form to the ancients. Mr. Moore more judiciously assumes the ignorance of the Greek and Roman writers respecting it, on the ground of their utter silence on the subject. ‘Erysipelas,’ he says, ‘erythema, lepra, herpes, and scrofula, are fully described by them; pimples, vesicles, and pustules, are also spoken of; but there is no account of a distemper clearly characterized, like the small-pox by the Arabians, though these were far inferior writers to Aretæus or Galen, or Celsus.’

Whence then the origin of small-pox? and whence its prevalence through the whole of the civilized world? Dr. Freind expresses his opinion that its seeds were first sown in Egypt. Dr. Mead supposed it to be of Æthiopian origin, and that from Æthiopia it extended itself into Arabia and Egypt. ‘Hic igitur morbus mihi vera pestis sui generis esse videtur; quæ in Africa primum genita, præsertim in Æthiopia, quæ pars ejus intolerabiliter est torrida, in Arabiam deinde et Ægyptum (ut vastatrix illa populorum magnæ pestis) iis, quas diximus, modis delata est.’

Were there, however, nothing stronger against the hypotheses of these learned physicians than the circumstance of small-pox being, with respect to its prevalence, in a great measure independent of climate or local peculiarities, this in itself would be a sufficient refutation of their notions of its origin. The mistake of these writers as to the actual nature and probable production of this distemper seems to arise principally from their confounding the ideas of contagion and infection: thus, in the quotation from Mead, it is evident that he conceives the small-pox to be a species of plague, engendered by the nature of the Æthiopian atmosphere; but it is known that real plagues, the *νσθημαλα επιχωρια* of Hippocrates, are incapable of being imparted, from one individual to another, in any part

part of the world, whatever may be the nature of the soil, the climate, or the atmosphere, in which such communication is made.*

Notwithstanding then that our most distinct and accredited accounts of small-pox are to be found in the Arabian writers who flourished during the dark ages of European learning, it seems difficult to conceive the spontaneous origin of its virus in this, or indeed in any other part of the world; and we are naturally led to search for its existence in still more ancient records.

In the second chapter of his volume, Mr. Moore has endeavoured, and we think successfully, to prove, by the details handed down from the earliest Christian missionaries to China, that small-pox existed in that country 'from a very remote period;' and that even the artificial mode of communicating the distemper was known and practised by the Chinese many centuries antecedent to the diffusion of the poison through other regions of the globe.

'The missionaries (says our author) who were sent into China by the church of Rome, from their address and insinuation gained access to their historical records; and they have transmitted detailed accounts of the history of the Chinese, and of their knowledge in various branches of science. There is a memoir written upon small-pox by the missionaries at Pekin, the substance of which is extracted from Chinese medical books, and especially from a work published by the Imperial College of Medicine, for the instruction of the physicians of the empire. This book is entitled, *Teou-tchin-fa*, or a treatise from the heart on small-pox; which states that this disease was unknown in the very early ages, and did not appear till the dynasty of Tcheou, which was about 1122 years before Christ. The Chinese name for the malady is a singular one, *Tai-tou*, or venom from the mother's breast; and a description is given of the fever, the eruption of pustules, their increase, flattening, and crusting. In the same Chinese book there is also an account of a species of inoculation discovered seven centuries previously; but according to a tradition it had been invented in the dynasty of Long, that is, about 590 years after Christ. Father d'Entrecolles, the Jesuit, (continues our author,) mixes, in his correspondence from China, some information respecting the small-pox, which confirms the material part of the above information, for he notices having read some Chinese books which mention the small-pox as a disease of the earliest ages. He also describes a method of communicating the disease, which was occasionally used, and called *sowing the small-pox*: this was generally performed by planting some of the crusts up the nose, an operation which was approved of by some, but disapproved by most authors.'

* This indeed constitutes the great leading distinction between contagious and infectious diseases—that the one are independent of place and circumstance, the other not. A great deal has recently been said on the non-contagious nature of the plague, and it should seem, at least, probable, that this disorder is incapable of transference in the way that our quarantine laws suppose; but utterly to deny its infectious quality is to fly in the face of all fact. Plague is an infectious, but not, perhaps, properly a contagious distemper.

After every deduction from the accuracy of the records in question on the score of traditionary claims and conceits, there still remains a sufficiency of testimony to the fact that the Chinese had been familiar with the small-pox many centuries before the Arabian writers described it; and its early existence in Japan and Hindostan is likewise presumable from several striking particulars connected with Hindoo mythology and worship.

Assuming then the fact that Asia was acquainted with the disease in question long before its establishment in any part either of Africa or Europe, and very far antecedent even to the time of Hippocrates, it becomes a question of interest 'how it happened that the infection did not extend into Persia, and thence into Greece, long before the age of the last mentioned author.'

That a communication was established between Persia and India by the invasion of the latter country at a very early period is universally acknowledged; and it is also admitted that 'the rapacious invaders who went from Persia would of course be attacked by the diseases which prevailed in the countries they laid waste;' but, adds Mr. Moore, 'the numbers which perished, the time which was spent in so distant a warfare, and the extent of the deserts which were recrossed, appear to have secured their native country from being contaminated by the few survivors of those expeditions. With respect to the commercial intercourse subsequently established between the more western and the eastern countries, and the probability of diseased communication from that source, we are likewise to recollect the obstacles which in those times existed to ready communication, either by land or sea, from one part of the globe to another.'

Among the many traditionary fancies respecting the origin of small-pox, there is one which supposes it to have been first imparted to man by the camel: this notion probably took its rise from the circumstance that land commerce from Egypt to India was only practicable by means of this animal. But such kind of traffic was tedious and difficult, and it is conjectured that no person known to have the small-pox upon him would ever have been suffered to join himself to a caravan. Again, the tediousness of coasting voyages, the only ones then attempted, gave time for contagion to be extinguished, if by accident any of the sick were admitted into the homeward bound ships from the east.

Such are the explanations proposed by Mr. Moore and others of the exemption of Europe from small-pox for so long a time subsequent to its prevalence in the east; and these certainly appear the only plausible conjectures on the assumed fact. Yet when we recollect the extreme subtlety, and insinuating and transportable nature of the virus, it seems extraordinary that even such an inter-

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rupted and difficult commerce as was carried on at the time alluded to did not prove a medium of conveying the poison from China and Hindostan to the more western nations.

‘If the Persians,’ says Mr. Moore, ‘had engaged early in maritime commerce, from their vicinity to India, they would probably have soon brought into their country the small-pox. But the ancient historians declare, that the Persians entertained an insuperable superstitious aversion to the sea; and Robertson asserts, that “no commercial intercourse seems to have been carried on by sea between Persia and India.” The spirit of commerce, when once excited, is however active and persevering; and the European demand for the muslins, the silks, the spices, the pearls, and the diamonds of the east, perpetually augmented. To facilitate their transportation, a busy coasting trade spread on both sides of the peninsula of Hindostan to the islands eastward, to the kingdom of Siam, and even to China. The luxurious productions of these distant countries were thus brought to the most convenient harbours to be conveyed to Alexandria and diffused through the Roman empire. This lucrative trade was so tempting, that towards the beginning of the sixth century, the Persians began to surmount their aversion to maritime affairs, and their harbours were filled with trading vessels. They soon monopolized the silk trade; for their vicinity to India gave them great advantages over the Egyptian merchants; *but it also augmented the danger of transporting the variolous contagion.* Indeed whatever attention might have been paid by the commanders of these merchant vessels, it was impossible that this calamity should have been avoided much longer; and as ships coming from India, both in their passage to the Persian Gulph, and to the Red Sea, *frequently touched at the Arabian ports, that country was peculiarly exposed, and there accordingly it was first observed.*’

Dr. Reiske, who was celebrated for his acquaintance with Arabian antiquities, in an inaugural Dissertation which he published in the year 1746, gave a translation of an Arabian manuscript found in the Leyden library, which dates the introduction of small-pox into Arabia in 572, the year that gave birth to Mahomet. Other testimonies seem to accord with the statement that it was at the siege of Mecca by Abrahah that the Arabians first became obnoxious to this pestilence.

The conquests of the false prophet, and the fanaticism of his followers, soon extended themselves far and wide; and, as may easily be conceived, the ravages of the new disease accompanied every where the track of the conquerors, who, in less than half a century, had established their dominion not only over Egypt and Syria, but a great part of Persia also. The contagion, however, was long prevented from finding its way into Europe, by the successful stand which the inhabitants of Constantinople made against the invaders. ‘Thus the Mahometan empire was bounded by the Hellespont, and that entrance for the small-pox into Europe barred up.’ This.

indeed, was done so effectually, that even in the tenth century we have it recorded by a resident physician in that city, (Nonus,) that neither the small-pox nor measles was known in Constantinople in his time.

It was not till the commencement of the eighth century, when the whole southern coasts of the Mediterranean had been subdued by the Arabians, that the contagion first visited Europe; and the landing of an army of Moors in Gibraltar and Spain, conducted by Julian, in order to revenge the outrage committed by Roderick on his daughter, is said to have been the means of introducing the disease in question into this quarter of the world.

‘By this invasion,’ says Mr. Moore, ‘the small-pox must have been brought into Spain, and the victorious Saracens soon reached the Pyrenees. In the year 731, Abderame crossed these mountains, and inundated the southern provinces of France with an host of Saracens. They were opposed under the walls of Tours by Charles Martel, when Christians and Mahometans fought six days, indecisively, for victory. But in a closer combat on the seventh day, the impetuous yet slender Africans and Asiatics were crushed by the superior strength of the Germanic warriors. The Saracens and the Koran were repelled into Spain, but the small-pox and measles remained in France. No warlike efforts could drive off these infections; and the opportunities of diffusing them had at that time become innumerable. The Saracen fleets were triumphant in the Mediterranean; Sicily and Italy were frequently invaded; many cities of the coast were repeatedly captured, and Rome itself was menaced. It cannot be doubted that so much intercourse with Africa and Asia brought over these maladies, though no direct proof can be adduced. But the circumstantial evidence is sufficiently conclusive.’

It has been maintained by Mead, and since by Baron Dimsdale, that the small-pox was first brought into Europe by the crusaders; but besides that the historians of the holy wars take no notice of the Christian armies having suffered from that malady, it is very properly remarked by Mr. Moore, that the assumption is inconsistent with the fact that so early as the eleventh century treatises were published, both in Spain and Italy, upon the small-pox, as a well known and common malady. To the American continent the virus was conveyed by the Spaniards in their invasion of Hispaniola and Mexico, and thus did this destructive pestilence, commencing in Asia, successively visit Africa, Europe, and the New World.

We come now to the origin and progress of inoculation, or the practice of artificially communicating the virus, in order to render the disease of a less malignant kind and character. It is pretty generally known that this was introduced into England from Constantinople, but, from the extracts already given from Mr. Moore’s publication, the artificial communication of the poison appears to have

have been established in China long before even the disease itself was heard of in the Byzantine capital.

Inoculation, at whatever time it originated, was most probably founded upon the accidental observation of the comparatively mild nature of the distemper in some, when compared with other instances, for no reasoning *à priori* would have conducted to the inference that by this mode of imparting the poison, the disease would be mitigated. Whether the suggestion or the discovery was first made by any of the faculty of medicine does not appear; as far as the imperfect accounts from Chinese records may be relied on, it seems to have been opposed very generally by the professed guardians of the public health.

‘No account,’ says Mr. Moore, ‘is handed down of the origin of this custom; but the reverence in which agriculture is held by the Chinese, may have suggested the name (sowing the small-pox), and the usual manner of performing the operation. For they took a few dried small-pox crusts, as if they were seeds, and planted them in the nose. A bit of musk was added, in order to correct the virulence of the poison, and perhaps to perfume the crusts, and the whole was wrapped up in a little cotton to prevent its dropping out of the nostril. The crusts employed were always taken from a healthy person who had the small-pox favourably; and with the vain hope of mitigating their acrimony, they were sometimes kept in close jars for years, and at other times were fumigated with salutary plants. Some physicians beat the crusts into powder, and advised their patients to take a pinch of this snuff; and when they could not prevail upon them, they mixed it with water into a paste, and applied it in that form. In Hindostan, if tradition may be relied on, inoculation itself has been practised from remote antiquity. This practice was in the hands of a particular tribe of brahmins, who were delegated from various religious colleges, and who travelled through the provinces for that purpose. The natives were strictly enjoined to abstain during a month preparatory to the operation from milk and butter; and when the Arabians and Portugeze appeared in that country, they were prohibited from taking animal food also. Men were commonly inoculated on the arm; but the girls not liking to have their arms disfigured, chose that it should be done low on the shoulders. But whatever part was fixed upon, was well rubbed with a piece of cloth, which afterwards became a perquisite of the brahmin; he then made a few slight scratches on the skin with a sharp instrument, and took a bit of cotton, which had been soaked the preceding year in variolous matter, moistened it with a drop or two of the holy water of the Ganges, and bound it upon the punctures. During the whole of this ceremony, the brahmin always preserved a solemn countenance, and recited the prayers appointed in the Attharna Veda, to propitiate the goddess who superintends the small-pox. The brahmin then gave his instructions, which were religiously observed. In six hours the bandage was to be taken off, and the pledget to be allowed to drop spontaneously. Early next morning cold water was to be poured upon the patient’s head and shoulders,

shoulders, and this was to be repeated till the fever came on. The ablution was then to be omitted; but as soon as the eruption appeared, it was to be resumed, and persevered in every morning and evening, till the crusts should fall off. Whenever the pustules should begin to change their colour, they were all to be opened with a fine pointed thorn. Confinement to the house was absolutely forbidden; the inoculated were to be freely exposed to every air that blew; but when the fever was upon them, they were sometimes permitted to be on a mat at the door. This regimen was to consist of the most refrigerating productions of the climate; as plantains, water-melons, their gruel made of rice or poppy-seeds, cold water and rice.'

Although it is not our design to engage in any practical discussion, it seems hardly possible to refrain from incidentally remarking the great superiority of these modes of treatment—a treatment founded on the dictates of nature—to those subsequently adopted by the Arabian and European physicians who forsook observation to follow hypothesis; and it is worthy notice that our modern improvements in the management of febrile and eruptive complaints consist mainly in permitting nature to follow its own course. We revert to ancient simplicity, and are therefore abundantly more successful than our immediate predecessors.

It has already been said that an obscurity hangs over the actual origin of this practice. In the opinion of some it commenced in the Arabian deserts, 'where neither physicians nor priests officiated; the practice being monopolized by old women.' From *sowing* the small pox, it came in the course of time to be, and perhaps was originally, called *buying* the disease; which proceeded, it is said, from the circumstance of one child carrying to another a few dates, or raisins, the pretended price of the matter: this custom of buying the small-pox becoming general among the inferior classes along the African coast, at length found its way into Europe, and was even practised in some parts of our island.

Still, however, the faculty took no cognizance of any artificial method of communicating the poison, until the year 1703, when Dr. Emanuel Temoni Alpeck, who had graduated both at Padua and at Oxford, and who was then residing in Constantinople, was struck with the instances which he witnessed of the mitigated nature of the distemper when the virus was thus received into the human frame.*

A Venetian physician also, of the name of Pylarnus, had about the same time made the same observation of the success of the Turkish practice, of which, in 1715, he published a statement at Venice, in a tract entitled '*Nova et tuta variolas excitandi per*

* Dr. Alpeck wrote an account of his observations to Dr. Woodward, by whom it was inserted in the Philosophical Transactions of the year 1714.

transplantationem methodus.' In the same year, too, Mr. Kennedy, an English surgeon, who had visited Turkey, endeavoured to excite professional attention to the advantages promised by the plan of engrafting, as he calls it, the small-pox.

It was, however, reserved for another coincidence in point both of time and circumstance, to be the means of rousing the members of the faculty from their apparent indisposition to investigate the merits of inoculation. Lady Mary Wortley Montague accompanied her husband as ambassador to the Ottoman court, and having observed with surprise that it was the custom in Constantinople for a set of old women to 'engraft' children with the small-pox every autumn, and moreover that the children thus infected had invariably a mild disease, she conceived the bold design of having her own son thus treated: this answered every expectation, and on her return to the British capital in 1722, she caused the same experiment to be made on her daughter, which was attended by the same happy results. Still, however, the profession hesitated to accept the proffered good, and notwithstanding that two princesses of the Royal family were successfully subjected to the same process under the influence of Lady Montague, the new practice went on at an exceedingly slow pace. As it was ascertained that the inoculated or ingrafted distemper was equally infectious with the disease when naturally acquired, it became a question in morals how far the individual who had his mind made up with regard to the eligibility of the practice, had a right thus to sow the seeds of the malady among others whose convictions were not in favour of inoculation, and who therefore refused its offers.

In process of time the question of inoculation came to be agitated with just the same virulence and party-spirit that have marked the modern controversy on the subject of vaccination, and it must be allowed to the impugners of the former, that they have a strong point in favour of their cause which the anti-vaccinists are without; since, as we shall speedily see, inoculation has proved a private good at the expense of being a public evil. So successful was the opposition to the practice of engraftment at the times to which we are now alluding, that in spite of the high authority by which it was sanctioned, it fell both in this country and throughout Europe into general disuse, 'and there seemed little reason to imagine it would be revived.'

'When in this dormant state news was brought that multitudes of Indians in South America had been inoculated with as much success by Carmelite Friars, as the Asiatics had been by the Greek old women: a physician and surgeon also began in the year 1738 to inoculate in South Carolina; and only lost eight persons out of eight hundred. But a planter in St. Christopher's inoculated three hundred persons without the

the loss of one. For it is singular that in those days all inoculations performed by private gentlemen, monks, and old women, were uniformly successful; and empirics afterwards were equally fortunate: none lost patients from inoculation except the regular members of the faculty. The American reports were so encouraging, that about the year 1740, the practice was revived by a few surgeons in Portsmouth, Chichester, Guilford, Petersfield, and Winchester; and gradually extended in the southern counties.'

Mead, too, took up his eloquent pen in the cause; and Mr. Moore tells us that his attributing the beauty of the Circassian women to the custom of inoculation which had obtained amongst them, had very considerable weight with the British ladies. The practice now very sensibly advanced among the higher circles, and for the accommodation of those in the lower walks of life, the Small-pox Hospital was erected in the year 1746. In 1754 the London College of Physicians gave their powerful sanction to the practice, by publishing a tract in its favour, and 'the press now groaned with works on inoculation, and with various plans of treatment.' These complicated modes of management, medicinal and otherwise, served, however, to bring the practice into discredit, which did not therefore become very generally diffused until its simplification and consequent improvement by a very conspicuous character in the *Annals of Medicine*.

'Daniel Sutton, (says Mr. Moore,) with his secret nostrums, propagated inoculation more in half a dozen years, than both the faculties of medicine and surgery, with the aid of the church, and the example of the court had been able to do in half a century. This man was the son of Robert Sutton, a surgeon at Debenham in Suffolk, and he and his brother assisted their father in his business. But after a time both sons left their father's house, and Daniel was content to serve as an assistant to a surgeon at Oxford. In the year 1763, he rejoined his father, and proposed to make some alterations in his plan of inoculation. These were condemned by the father as highly dangerous, yet Daniel was so confident as to make the experiment, and he found it successful. On this the father and son quarrelled, and the latter set off for Ingatestone, in Essex, where he set up as an empirical inoculator. He pretended to have discovered an infallible secret, and brought himself into public notice by the old and still successful trick of puffing hand-bills and boasting advertisements. Yet, in truth, his pretensions, though extravagant, were not without foundation; and in a short time such multitudes crowded to Ingatestone to be inoculated, that the town and neighbouring villages were filled with patients. It is much to be regretted, (adds our author,) that Sutton should have stooped to employ such unworthy devices; for his plan of treatment was greatly superior to that of any former practitioner; and had he followed the correct rules of open professional conduct, his name would have been recorded with honourable distinction. It appears, however, by the analyses

analyses of his medicine and his own confession in his old age, that Daniel Sutton, in strictness, invented nothing, but judiciously combined remedies which had been found out independently by others. Sydenham had discovered the utility of exposing small-pox patients to the cool air, and of allowing them to drink cold water, but he did not venture to deviate so much from ordinary rules as to prescribe purgatives. Subsequent physicians had ascertained that great benefit arose from opening medicines, and particularly from mercurial purges; but in conformity to old theories, they at the same time confined their patients to bed, covered them warmly, and promoted perspiration. But Sutton had the sagacity to extract what was beneficial in both these plans, and to reject what was injurious. Almost every modern essay now recommended purgatives, and our reformer only made choice of the prescription which was most in vogue.'

We have introduced these remarks on Sutton's plans of treatment, merely in conformity with our wish to give as satisfactory an explanation as possible of the eventual success of inoculation; which now spread rapidly through almost the whole of Europe, with the exception of Spain. That country, as our author states, in the present case, profited by its sluggish indisposition to adopt the improvement of neighbouring nations; for after some partial and feeble attempts to introduce the practice, the endeavour was relinquished; and it is a notorious fact, and highly worthy of remark, that Spain has suffered incomparably less from small-pox than any other European state: the reason is sufficiently obvious; and the fact furnishes an equally obvious objection, as above hinted, against the practice of artificially disseminating a distemper so infectious, and so fatal. It is indeed beyond dispute that even the mortality from small-pox increased with the progress of inoculation, 'from the impossibility of prevailing upon the whole population to adopt medical counsel;' and of two estimates by two accredited physicians made of deaths from small-pox during the last thirty years of the preceding century, and laid before a committee of the House of Commons, 'the one stated the average numbers at 34,260, adding that he believed those deaths to be under the truth: the other physician made them amount to 36,000.'

'But this immense and *increasing* consumption of human lives, was not the sole evil produced by this distemper; for a considerable portion of the survivors were pitted and disfigured; some lost one of their eyes, a few became totally blind, and others had their constitution impaired, and predisposed to a variety of complaints, which were productive of future distress, and sometimes of death.'

In this state, then, did things stand in reference to small-pox, natural and acquired, when the newly suggested substitute presented its claims to the consideration of mankind; and the momentous business now devolves on us of investigating the legitimacy of these

these claims, or of ascertaining the grounds upon which such high pretensions are preferred.

Dr. Jenner (whose name requires no formal introduction) was originally employed in general practice in a district in Gloucestershire. It was in the year 1768 that he first heard the report of those sores which infested the teats of cows, and which infected the chapped hands of the milkers, being sometimes a preventive of small-pox; and, in connexion with this report, it struck him as a remarkable fact, which came under his own cognizance, that many of the peasants whom he endeavoured to inoculate resisted the infection. Although these circumstances made at the time some impression on his mind, he did not systematically prosecute the investigation to which they ultimately led until after his return from London to establish himself at Berkeley. Then it was that he commenced the inquiry in earnest; and in the relation which he has given of the progress of his labours in this very extraordinary pursuit, he informs us,

‘ That the disease (the cow-pox) had been known in the dairies from time immemorial, and a vague opinion prevailed that it was a preventive of small-pox. This opinion I found was comparatively new; for all the old farmers declared they had no such ideas in their early days, a circumstance which seemed easily accounted for, from my knowing the common people were very rarely inoculated for the small-pox, till that practice was become general, by the improved method introduced by the Suttons; so that working people in the dairies were very seldom put to the test of the preventive power of the cow-pox.’

As Dr. Jenner proceeded with his inquiries, he found that several persons contracted the small-pox after they had been subjected to the disease from the cow; and moreover that the medical practitioners in the neighbourhood ‘ all agreed in declaring, from experience, that the cow-pox was only an occasional, and a very uncertain preventive of small-pox.’ These discoveries were certainly of a disheartening nature; but, although they might damp the ardour of hope, they did not cause the abandonment of the pursuit. On further investigation he ascertained that the cow had occasionally several varieties of eruptions on her teat, all of which were indiscriminately named cow-pox when productive of sores on the hands of the milkers; and it occurred to him as very probable that only one species of these eruptions possessed the preventive power; and that this was the true explanation of the observed irregularity in point of effect. One obstacle thus appeared to be done away; but lo! another now presented itself, which by most persons would have been considered insuperable;—‘ to his great mortification, Jenner found several examples of milkers who were seized with the small-pox, after having contracted sores on their hands from
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the genuine cow-pox.' In spite even of this, our indefatigable investigator pursued his researches; and as it seemed to him inconsistent with the general uniformity of the laws of nature that this difference of susceptibility should so widely obtain, it occurred to him that the specific influence of the poison might not improbably vary with the progressive changes it underwent, after having been first secreted from the ulcerated surfaces of the cow's teat; and,

'after much investigation, he at length ascertained, that the milkers, who acquired the cow-pox from vesicles on the teats of the cows, while advancing to maturity, were secured from the small-pox; while those contaminated by cows, in an advanced period of the disease, remained susceptible of the small-pox. In fine, from a multitude of cases he was enabled to draw these conclusions, that the property of preventing the small-pox appertained only to one of those diseases which were vulgarly denominated the cow-pox; and that this power principally resided in the liquid secreted during the early stages of that disease.'*

With these exceptions then of a spurious matter in the one case, and of a matter taken at a wrong time in the other, Jenner conceived that he had made out the fact of cow-pox being a preventive of small-pox for life; for he exposed in various ways individuals, who had been the subjects of the former, to the latter infection, (after the lapse of fifteen, twenty-seven, and even fifty years,) and found that they resisted its influence.

Thus a clear way was opened for the important application of this singular discovery. May not this preventive be propagated from man to man, and thus supersede the small-pox virus? was the idea that suggested itself to the mind of the discoverer, a suggestion, which it is needless to say has been extensively acted on, and which has given rise to one of the most important problems ever proposed, viz. Is vaccination an actual, a permanent, a safe, and unobjectionable security against small-pox infection?

For a moment we will suppose its preventive efficacy to be admitted, in order to advert to a separate charge which has been adduced against its employment,—for the vaccine virus has been said to be a means of engendering foul humours, to lay the foundation

* Not with a desire to prejudice the case, but merely for the purpose of pointing out that analogy subsisting between the variolous and vaccine secretions, which is contended for by some writers, we subjoin the following extract from Mr. Moore, as a continuation of and comment upon the above quotation:—

'Jenner,' says Mr. Moore, 'perceived that these opinions corresponded with remarks that had been made on the small-pox, as the liquid most active for variolous inoculation is that which is first secreted; but the thick matter of pustules which have crusted, though it may excite local inflammation and suppuration, yet frequently fails of producing the real small-pox.'

of several chronic diseases, and to be therefore in the highest degree objectionable. This charge can only be substantiated by an appeal to facts; what then do these testify? Have chronic cutaneous eruptions (the disorders alleged to be the consequences of vaccination) recently been on the increase? All medical records and reports, presented to the world for the last twenty years, agree in the diminution rather than the augmentation, both of the number and severity of the complaints in question; and what may be considered as decisively to the point, is the following statement from a respectable surgeon to the Infirmary at Gloucester:—

‘A more healthy description,’ says this gentleman, ‘of human beings does not exist, nor one more free from chronic cutaneous impurities, than that which suffers most from cow-pox, by reason of their being employed in dairies; and the Gloucester Infirmary, one of the largest provincial hospitals, is situated in a county in which accidental cow-pox has been prevalent from time immemorial; many hundreds among the labouring people have had the cow-pox since the establishment of that institution, and that more severely than is generally the case in artificial vaccination, and yet not a single patient has applied to the Infirmary in half a century for the relief of any disease, local or constitutional, which he or she imputed, or pretended to trace to the cow-pox: and let it be repeated and remembered, that the artificial in no respect differs from the natural, except in being generally less virulent.’

This document, backed by the concurrent testimony of impartial and unprejudiced records from medical observers, that scrophulous and cutaneous affections are (as we have said) upon the decline, will, it is presumed, serve as a sufficient refutation of those partial and garbled statements which in the early stages of the controversy were made for the purpose of confirming the apprehensions of the timid, and giving strength to ungrounded prejudices. The question therefore of vaccine efficacy remains unincumbered by minor considerations, and it is now for us finally to observe upon the evidence by which the following proposition has been maintained, viz. that the vaccinated and the inoculated child stand upon precisely the same footing in respect of security against small-pox.

In spite of our professions of impartiality, we suspect that our readers have by this time set us down as determined defenders of the vaccine cause. We shall probably, therefore, excite some surprise by expressing it as our opinion, that the absolute truth of the above proposition does not appear to us to have been hitherto fairly established. It does, we confess, seem probable that there may be a shade of difference in the preventive efficacy of the vaccine and variolous virus; even this, however,
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we must allow to the advocates of vaccination, has not been proved, and we hasten to adduce the evidence on either side.

Mr. Moore, who is a professed partizan of vaccination, argues for its identity as to effect on the ground of analogy, and contends that the exercise of the virus of only a partially preventive power would be an anomaly in nature. This argument is in itself forcible, and is managed by our author with considerable adroitness. It is needless, however, to remark, that it must fall powerless even out of Mr. Moore's hands unless backed by actual observation:—the preventive efficacy of vaccination is a question not of theory but of fact. That there have happened cases of small-pox of an indisputable nature, subsequently even to proper vaccination, no one can deny; but then it is urged that small-pox has likewise been known to occur twice to the same individual, and to have succeeded to inoculation in the same manner as it has to vaccination. The point, however, at issue is whether these anomalies are proportionately as frequent in the latter as in the former case; and, in determining this, Mr. Moore contends that the comparative estimates have not been made with due attention to every necessary particular.

'In making this estimate,' he says, 'an error has been committed by comparing the results of the *primary* practice of vaccination with those of the most approved state of variolous inoculation, forgetting that, when the latter operation was introduced, failures of every kind were far more frequent than of late, and that even the deaths amounted in early practice to one in fifty. In like manner, vaccination, on its first introduction, was so misconducted, that two children in a workhouse were actually destroyed by it, although, when skilfully practised, it is really less dangerous than opening a vein or cutting a corn. A multitude of lesser mistakes were then committed by the ablest men in the profession, who, deceived by analogy, imitated too nearly the plan of the small-pox inoculation; and many were not sufficiently aware either of the deterioration to which vaccine lymph is subject, or of the mischiefs which arise even when the lymph is pure from the vaccine process being interrupted or disturbed by violence, or by disease. The number of failures from all these sources of error in early practice has been considerable; it is therefore too soon at present to compute and compare the number of cases in which small-pox has occurred after inoculation and vaccination.'

We are not sure whether this be not rather too much in the spirit of a systematic advocate. Mr. Moore talks of failures from inoculation when first practised being one in fifty; but it ought to be recollected that such failures were rather referable to the mode of communicating and managing the disease, than to the occurrence of any second affection. Now the case is far different with vaccination; for 'although two children in a workhouse were actually destroyed

stroyed by it,' these instances stand almost alone in the records of the practice; and, however inefficiently the process may have been performed by the several vaccinators who have undertaken the task without being qualified for the office, we do not hear, excepting from the most prejudiced and partial quarters, that any positive injury was ever inflicted on the children thus ineffectually operated upon.

The best stand which the vaccinists can make on the ground of comparative estimates, is that of the immense multitudes which have undergone the process since the commencement of vaccination, compared with those subjected to inoculation in the same number of years from its primary establishment. When we hear of one case after another, therefore, of small-pox subsequent to cow-pox, it may be replied, that had as many children been inoculated, in place of being vaccinated, the instances of failure would be equally numerous. Whether such position would be correct can scarcely be ascertained, since there is no register of the number of failures in either case, and without it no actual calculation can be made. We have, however, been just favoured with a document from the Small-pox Hospital, which, in connection with the remarks that accompany it, is highly favourable to the vaccine cause; and let it be recollected that these remarks come from one who so far from having been an enthusiast at origine in the cause of cow-pox, has been accused by his contemporaries of being a covert enemy to its success.

'Every passing month,' says Dr. Adams, physician to the Institution just named, 'serves to convince me of the absolutely preventive power of vaccination when properly conducted. Not very long since, my observations led me to the inference that the efficacy of inoculation, when compared with vaccination, or rather the probability of failures from one and the other, stood at about the proportion of 1200 to 1000; but I am now, to say the least, inclined to the inference, that both, when properly managed, are *equally* efficacious; and that the instances of failure we hear of, are either to be accounted for by the very large numbers that have been vaccinated, or by the process having been inefficiently performed.'

Such are the opinions of the principal officer, not of a *Vaccine* establishment, but of the *Small-pox* Hospital, where, if in any place, failures are likely to be heard and complained of. The document to which we have alluded, is a statement of the numbers inoculated, vaccinated, and admitted with the natural small-pox during the last seven years. The numbers inoculated, it will be observed, are marked 'admitted;' since the laws of the institution require that those individuals, who are inoculated, shall not leave the hospital till the fear of infection is over.

	Admitted for Inoculation.	Vaccinated.	Admitted for natural Small-pox.
1811	86	1458	94
1812	82	1939	144
1813	50	1831	69
1814	35	1671	79
1815	30	2446	101
1816	37	2318	141
1817	42	3127	160

The reader who shall cast his eye over the above table will perceive that the numbers of vaccinated subjects have been very much increased during the three preceding years; and that the numbers of cases of natural small-pox have been likewise, during the same period, more numerous than before; the chances, then, of failure in both ways, that is, both from the increased prevalence of small-pox infection, and the increased number of vaccinated subjects must have been considerably multiplied; and yet we are told by the medical officers of the Institution, that such failures are decidedly and very materially upon the decrease; and let it be again remarked, that such statement comes from gentlemen whose minds, if they were likely to be biassed in any way, would rather bend towards the side of inoculation.

But, on the other hand, we hear of small-pox happening after vaccination in some institutions and districts in far greater numbers than would in all probability have been the case, had the individuals, instead of being vaccinated, been subject to inoculation. The children of Christ's Hospital, for instance, are under medical management of the most respectable kind; and the diseases happening in this institution are carefully recorded in quarterly reports. Now in these reports, 'Variola post vaccinationem' often occurs—a sequence which was not noticed, at least not recorded, when the boys were generally, as in former years, inoculated. We have further, another report from authority of an indisputable kind, stating, that in one small town and its immediate neighbourhood, fifty-four cases had been seen of small-pox subsequently to the vaccine disease. These, then, we repeat, and other testimonies more or less strongly to the same effect, are certainly calculated to make us pause before we set our hands to the proposition, that there is an absolute identity of preventive effect in genuine small-pox and genuine cow-pox.

Vaccination, however, has, we conceive, enough of positive evidence in its favour to meet all that has hitherto been advanced against it, either in the way of argument or fact. In the first place, it is to be observed, that with very little exception indeed, the cases of the variolous occurring after the vaccine affection, are of so mild and modified a nature as to be hardly worthy notice; and that

even when such cases assume in the first stages somewhat of a malignant type, the unfavourable symptoms soon die away, and the period of danger in other variolous disorders becomes in these the period of convalescence. This, indeed, with the most trifling exception, is so much the case, that for our own parts we should witness with next to nothing of apprehension, small-pox breaking out among our own children, or the children of our relatives; and the strongest evidence that has hitherto been adduced against vaccination has never produced any solicitude in our minds that the children in whose welfare we are more immediately interested should be kept from small-pox exposure. Secondly, we may remark, that this kind of small-pox, thus modified and disarmed of all its malignity, has so many features of resemblance to those eruptions which are named chicken-pox, that it is fair to presume many supposed instances of the former have been in reality cases of the latter. This may easily be conceived, when we advert to the apprehensions of some, and we are concerned to state the apparent desire of others of meeting with facts adverse to the vaccine cause. Indeed, we scarcely hear now, as we were wont to do, of chicken-pox, but every eruption is put down to the head of small-pox after cow-pox.

But, thirdly, what shall we say to foreign reports in favour of the new practice? Amsterdam, it is affirmed, has not for a long time seen a single case of small-pox subsequent to vaccination; and in the year 1813, a report was published by the imperial institution of France, stating that 2,671,622 subjects had been properly vaccinated in France, of whom only *seven* had afterwards taken the small-pox! and it was added, that the well authenticated cases of persons taking the small-pox after variolous inoculation are proportionably far more numerous: and, indeed, reports of a similar nature reach this country from every part of the world in which the new practice has obtained—and where has it not obtained? It may be still urged that the immunity, after all, may be only for a time; but besides that this supposition violates the laws of all analogy, it is, in truth, contrary to the evidence of fact. Dr. Jenner, as we have already noticed, actually proved the impotency of the small-pox virus, as applied to individuals who had been subjected to the cow-pox fifty years before the experiment; and, let it be observed, as an important circumstance, that even natural cow-pox is imparted in the way of inoculation.

In conclusion, then, we would express it as our sincere and unbiassed conviction, that whether vaccination be or be not precisely the same as variolous inoculation, in regard to its preventive power over small-pox, it is demonstrably efficacious enough to justify its universal adoption; and that it deserves to be appreciated as one of the greatest blessings ever bestowed upon mankind by a

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beneficent Providence. It is a mild substitute for a most malignant distemper; it is certainly not more influential in exciting latent complaints of the constitution, most probably much less so, than the old inoculation; and, to crown all, it does not sow the seeds among the community of a loathsome and devastating distemper!

On the merits of the treatises, the title-pages of which stand at the head of this article, we need say but little. The first of the volumes we have indeed tacitly expressed our approbation of, by the large use we have made of its contents. It is a most interesting,—we had almost said (notwithstanding that it is a treatise on small-pox) a fascinating work. The author has proved himself rich in resources and masterly in the management of them. Indeed, we have no hesitation in placing this performance of Mr. Moore among the few lasting monuments of medical literature. Sorry, however, are we to add, that the spirit of the partizan has, in the second volume, too much taken place of the mind of the liberal and learned historian; its composition, too, as a literary production, is, in all respects, inferior to the other. The author has been guilty in it of many offences, not merely against precision and taste, but against the most common principles of grammatical construction; and these become more conspicuous when contrasted with the chaste and classical style which pervades his History of Small-pox.

ART. VI.—*Essays on the Proximate Mechanical Causes of the General Phenomena of the Universe.* By Sir Richard Phillips. London. 12mo.

IT is not without some reason that the life of a man of science is commonly thought dull and uninviting. He spends his time in researches of remote utility and little general interest, and it is in most cases only by toilsome processes, and after repeated disappointments, that he arrives at his results. There are some, however, who attain the same ends by easier means, whose ardent progress in discovery ‘no cold medium knows,’ who scorn the slow path of gradual advancement, and leap at once beyond the farthest bounds of knowledge.

Of this small, but envied class, Sir Richard Phillips appears to be a distinguished member. His mind, unfettered by prejudice, unincumbered by knowledge, can at one glance, and apparently without any remarkable expenditure of thought, see through the fallacies of those systems of philosophy which have till now deluded the world, and dive into the secret foundations of nature. He has kindly and boldly determined to communicate his discoveries to the world. With a chivalrous spirit, worthy of a knight of better times, he despises the dangers which await such an undertaking. Of these

dangers he is well aware; he knows that ‘ combinations against truth are more systematic and compact in this age than in any former period;’ that ‘ prejudices are universally the tests of truth;’ and he ‘ fully expects to be vilified, reviled and anathematized for many years to come.’ ‘ He consoles himself, however, with reflecting that words and grimaces break no bones; and having the confidence of a martyr in the verity of his general system, he will bear his reproaches with patience, and, like a martyr, expect his reward in a crown of glory in some future age, when he shall be insensible to the distinction.’ Upon this distant expectation he has acted, and as ‘ it is his ambition to publish great truths in small books,’ he has in a thin duodecimo raised ‘ the first curtain which hitherto has veiled the Temple of Nature.’ Let us hope that mankind may be sensible to his merits, and that his reward may not be so long deferred as his modest fears anticipate.

Our author’s first enterprize is an attack upon the errors and absurdities of Newton’s philosophy, errors, some of which are so striking that he ‘ almost blushes to name’ them. He sneers at the ‘ awkward attempts’ of Sir Isaac to do that which was reserved for Sir Richard, and easily explodes ‘ the philosophical trinity of gravitating force, projectile force, and void space.’ He explains to us how it happened, that Newton was gradually led from one mistake to another to establish so ridiculous a system. It seems that the root of the evil, the ‘ first error,’ was the admission of the doctrine of gravitation. ‘ Newton mistook the local cause of the fall of projectiles: he adopted the errors of his own age and education in this radical principle of his philosophy.’ This unfortunate slip ‘ rendered it convenient to admit the other power of an innate projectile force,’ ‘ the greatest absurdity ever broached in science.’ It was not from any more creditable motives, or on better grounds, that the notion of a vacuum was admitted into the system.

‘ Is it necessary to examine in the first place, whether any medium exists or does not exist in space? Newton annihilated such medium for the purpose of conferring perpetuity on his original projectile force! If, said he, there be matter in space, its resistance would destroy the projectile force; for as he ascribed the centripetal force to an innate or metaphysical principle, and, as on his system, intervening matter was not required to concur in producing the motions, it would, if it existed, necessarily resist them. Newton, therefore, deemed it expedient to assert, that matter is not infinitely diffused throughout space.’—p. 51.

We confess that notwithstanding the present exposure of the many fallacies by which Sir Isaac Newton has deceived us, we have still remaining a small degree of kindness towards him, which makes us grieve to see him thus hardly used. We wish our knight had spared his rival a little, and, considering that he was ‘ as feeble

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